



Sun's Performance Comparisons: Solaris v. Linux

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Strategic Applications Engineering

- Strategic Industry Benchmarks (SPARC/Opteron All Products)
 - > TPC, SPEC, SAP, HPC, etc... showing scalability & perf
 - > 12 SPARC & 41 Opteron World Records in last 3 quarters
 - > Sun's benchmark leadership is part of reason why Sun is growing and IBM, Dell, HP lost market share Q2-06!
- Benchmark work helps Tuning/Optimization/Analysis
 - > Recommendations to customers, SEs, pro services
 - > Triage of Parameters: critical, important, basic
 - > Fortunately only a handful are critical
 - > Feedback to RDBMS, APPS, OS, HW
 - > Testing bounds Of latest HW & SW (performance & QA)
- Sun Characterization of Solution Features
 - > Domains, Solaris Management, Java, etc...

Solaris Advantages Over Linux

- Clear Performance Advantages over RedHat & SuSE Linux
 - > Linux supporters often point to simplistic OS comparisons
 - > Solaris advantage on real applications & at high load
 - Scientific Applications – Solaris Faster
 - CFD application
 - MCAE/MCAD application
 - BioInformatics: Blast
 - Commercial & Database
 - Application Tier: SPECjbb2005
 - Database Tier: MySQL iGen
- Various other benefits of Solaris
 - > zones & mixed workloads, Dynamic Match resource to load
 - > Ease system management
 - > Reduced cost of ownership

CFD Application

Preliminary Solaris Benchmark

- Solaris is up to 27% faster than Linux on same HW
 - > Sun Fire X4100 M2 2-socket 2.8GHz Dual-core Opteron - Solaris 10 beats SuSE Linux SLES9 SP3
 - > Medium & large workloads show Solaris advantage
 - > Workload detail: test_a 27%, test_b 11%, test_c 7%, test_d 9%, test_e 2%, test_f 16%
 - > One customer code showed Solaris 17% better
 - > 4-socket benchmarks show same Solaris advantage
 - > Solaris beats Linux: X4600 3GHz 1-core Opteron
 - > 4-core Opteron/Solaris beat 4-core Woodcrest/Linux
 - > Ex: test_b, test_c, test_e

MCAE Applications

Preliminary Solaris Benchmark

- Solaris is up to 60% faster than Linux on same hardware, 1- CPU results
 - > Sun Fire X4600 4-socket 3.0 GHz single-core, Opteron - Solaris 10 beats SuSE SLES9 Linux SP3
 - > 'Vendor benchmark' shows Solaris advantage
 - 1test 20% faster
 - 2test 20% faster
 - 3test 20% faster
 - 4test 5% faster
 - 5test 60% faster
 - 6test 30% faster

SPECCompM2001: Sun Fire X4200/X4100 2.8GHz Opteron comparison (Nov-Dec '06)

- Solaris 10 & Studio11 compilers deliver fastest solutions
 - > Beats Linux/PGI by 31%
 - > Beats Linux/Pathscale by 8%
 - > Solaris 10 & Studio 11: 13,222 SPECCompM2001
 - Opteron 2220
 - > Linux & PGI 6.2-4: 10,085 SPECCompM2001
 - Opteron 8220 SuSE SLES9 SP3 64-bit Linux
 - faster CL4 dimms, regardless Sun still faster
 - > Linux & Pathscale: 12,172 SPECCompM2001
 - SuSE SLES9 SP3 64-bit Linux
- Sun's Operating System and Compilers deliver performance advantages

SPECCompL2001: Sun Fire X4600 M2 2.8GHz Opteron comparison (Apr '07)

- Solaris 10/Sun Studio 11 beats Red Hat Linux using PathScale v2.5 compiler by 8% on the same hardware
- Solaris 10/Sun Studio 11:
 - > SPECCompLpeak2001 111893
 - > SPECCompLbase2001 105465
- RedHat Linux RHEL4/PathScale:
 - > SPECCompLpeak2001 103466
 - > SPECCompLbase2001 100610
- Sun X4600 M2 (8threads/8cores/4chips/Opteron 8220)

Bioinformatics BLAST: Solaris Beats Linux

History of Solaris Leadership (Apr 2005)

- Sun Java Workstation W2100z/W1100z & Solaris 10
 - > BLAST 2.2.9 Benchmark:
 - > Bioinformatics Application, Nucleotides Pattern Matching
 - > W1100z 2.4GHz up to 48% faster than Dell 360n 3.4 GHz Xeon & Red Hat Linux
 - > W2100z 2.4GHz up to 34% faster than Dell 650 3.4 GHz Pentium & Red Hat Linux

<u>System</u>	<u>CPU</u>	<u>Secs</u>	<u>\$/Perf</u>	<u>Secs</u>	<u>\$/Perf</u>	<u>OS</u>
W2100z	2	61.20	\$ 3.12	11947	\$ 609.10	Solaris 10
Dell 650	2	82.07	\$ 5.55	14506	\$ 981.51	Red Hat Linux
W1100z	1	133.30	\$ 6.47	18063	\$ 877.02	Solaris 10
Dell 360	1	197.32	\$ 5.02	25541	\$ 649.46	Red Hat Linux
Dell 650	1	214.20	\$10.01	27559	\$1287.68	Red Hat Linux

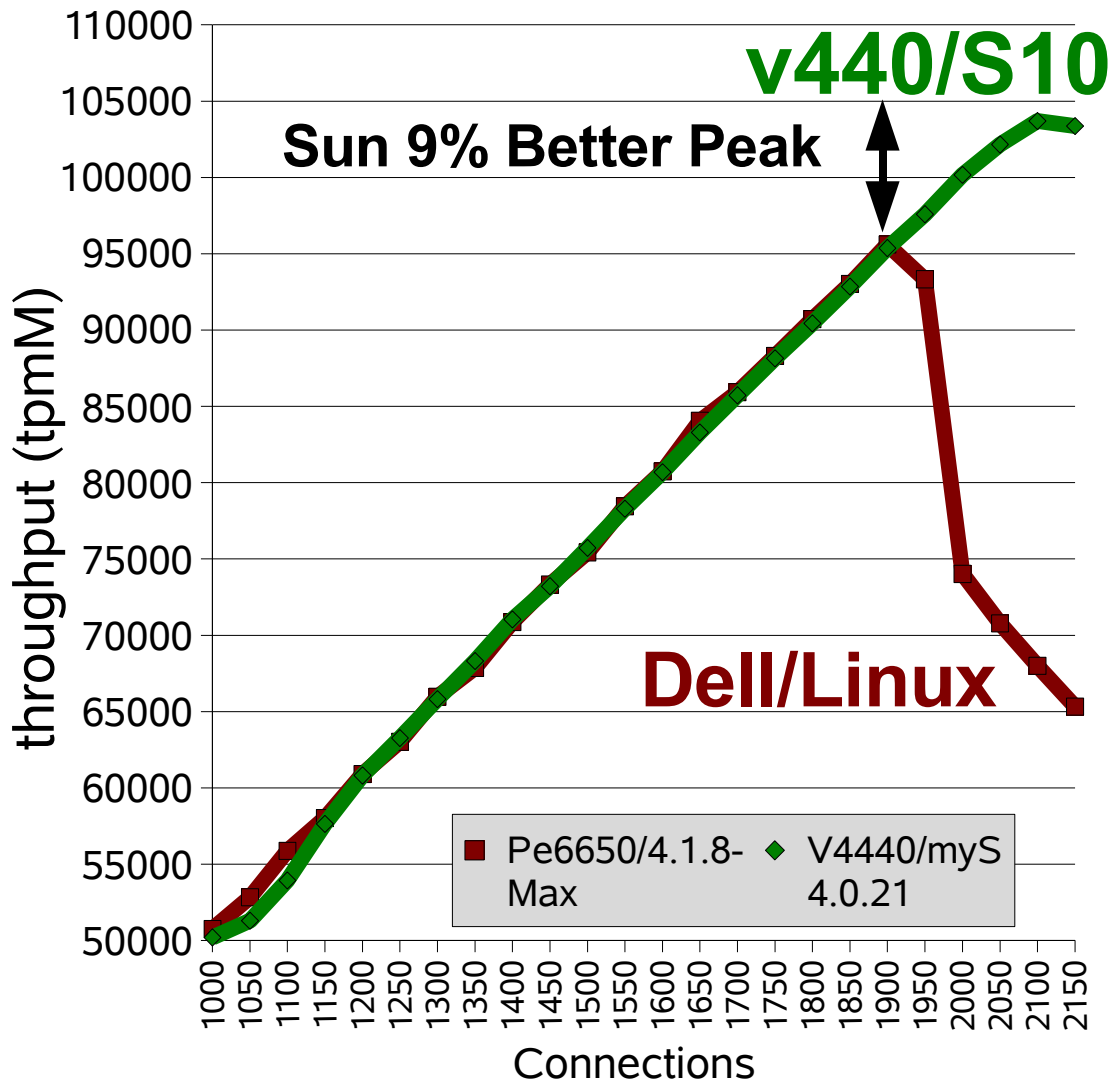
SPECjbb2005: Sun Fire X4200/X4100

Same hardware, same good tuning:

- Solaris 10 Faster than Windows/Linux, Even with low OS demands Solaris 10 is fastest
 - >49,097 SPECjbb2005 bops on Solaris 10
 - >47,437 SPECjbb2005 bops on Windows 2003 OS
 - >43,076 SPECjbb2005 bops on RedHat Linux4u2
 - >Java HotSpot(TM) 32-Bit Server, Ver. 1.5.0_06
- Opteron Dual-core 2.6 GHz, 285SE
 - > Solaris10 4-core 32-bit JVM: 49,097 SPECjbb2005 bops
 - >Sun Fire X4100/X4200 & Solaris 10 beats IBM x346 2.8GHz dual-core Xeon by 24%

iGEN MySQL: Ad Hoc OLTP Database

High loads cause Linux problems



IGEN OLTP w/MySQL:

- Linux has Huge Drop in Performance & Huge Increase in Response Time!
- Sun Wins by Even More when using Popular Commercial RDBMS
- V440 1.6 GHz USIIIi w/S10 - 9% higher peak over Linux 2.6/Xeon 3.0 GHz

Sun's iGEN-OLTP Workload

- OLTP Workload developed by iForce Engineering Group
 - > Derived from Sun Customer Benchmarks
- Simulates an Order Entry Application consisting of a set of DB transactions, I/O & network load
 - > Scalable DB size and Number of Users (DB connections)
- Shows Solaris Advantage over Linux at high-utilization

Linux has Serious Incompatibilities between Releases:

- Sun guarantees Solaris version compatibility!
- New releases of Linux have caused problems with Major ISVs in MCAD/MCAE, CFD, & EDA
 - > Many issues with incompatible shared libraries
 - > Issues with interconnect software (SuSE SP2 v. SP3)
 - > Extra worked needed by ISVs for both RedHat & SuSE
 - > Customers often delay upgrades for mission critical apps
 - > Difficult for users to coordinate Linux versions of 3-4 interacting apps which may require different versions

Linux Oracle9i RAC Issues: Other Examples of Linux issues

- Software Volume Managers Unusable with RAC – HW Raid is Required
- Above Two Nodes...
 - > Not Able to Use Direct Attached SCSI storage
 - > Not Able to Use Direct Connect “heartbeat”, Need Expensive Network Switch
- RAC Installation on Linux
 - > RedHat 3.0 and Oracle Installation Needs Multiple Patches for Oracle, Shared Libraries, gcc and Java Updates
 - > The Complex Install Sequence is Error Prone

Legal Substantiation



(Include this slide with each US-IV+ and Opteron presentation)

SPEC, SPECfp, SPECint, SPECweb, SPECComp, SPECjbb, SPECjAppServer are reg TM of the Standard Performance Evaluation Corporation.

SPECjbb2005 Sun Fire X4100/X4200 (2 chips, 4 cores, Solaris 10) 49,097 SPECjbb2005 bops, 49,097 SPECjbb2005 bops/JVM, Sun Fire X4100/X4200 (2 chips, 4 cores, Windows2003) 47,437 SPECjbb2005 bops, 47,437 SPECjbb2005 bops/JVM, Sun Fire X4100/X4200 (2 chips, 4 cores, RHEL4u2) 43,076 SPECjbb2005 bops, 43,076 SPECjbb2005 bops/JVM.

SPEC, SPECComp reg tm of Standard Performance Evaluation Corporation. Results from www.spec.org as of Oct 16, 2006, Sun result submitted to SPEC. Sun Fire X4100/X4200 M2 (4 cores, 2 chips, 4 threads), 13,222 SPECCompM2001 peak. AMD Tyan n6650w (4 cores, 2 chips, 4 threads), 10,085 SPECCompM2001 peak PGI compiler. AMD Tyan n6650w (4 cores, 2 chips, 4 threads), 12,172 SPECCompM2001 base Pathscale compiler. Sockets refers to chips.

SPEC, SPECComp reg tm of Standard Performance Evaluation Corporation. Results from www.spec.org as of Mar 19, 2007, Sun result submitted to SPEC. Sun Fire X4600 M2 (S10/SS11, Opteron 8220, 8 cores, 4 chips, 8 threads), 111893 SPECCompL2001. Sun Fire X4600 M2 (RHEL4u4, Opteron 8220, 8 cores, 4 chips, 8 threads), 103466 SPECCompL2001. HP DL585 G2 Opteron 8220SE (RHEL4u4, Opteron 8220, 8 cores, 4 chips, 8 threads), 103466 SPECCompL2001. Sockets refers to chips.

Conclusion

- Solaris leads in performance for real customers
 - > Sun has a huge variety of benchmarks in many applications
- Solaris is an **AMAZING** Operating System!
 - > Enables better performance
 - > Enables better scalability
 - > Great industrial strength Operating Systems
 - > Great features: Zones, Domains, dtrace,...
- Solaris is now free as Linux
 - > When SW support is critical, Solaris has better support
 - > Solaris is faster, robust and dependable as always.
- Solaris on Sun Opteron can beat \$/perf of Linux



Great Performance Across the Product Line

Brad Carlile

<http://sae.central/> -- For All of the Latest Information

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